ENVIRONMENTAL MANAGEMENT

Technical Assistance Report MEMP 1

Technical Solutions Workshop

Miamisburg Environmental Management Project

Concerning

Mitigation of Fugitive Emissions During Building D&D

DRAFT 6

Prepared by

The Office of Science and Technology (EM-50)
Technical Assistance Team

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U.S. Department of Energy · Office of Environmental

Management

List of Acronyms

BWXTO	BWXT of Ohio, Inc.
CAP88	Clean Air Act Assessment Package - 1988
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
D&D	Decontamination and Demolition
DOE	U.S. Department of Energy
DOE-OH	U.S. Department of Energy Ohio Field Office
EM	DOE Office of Environmental Management
EM-50	DOE Office of Science and Technology
EPA	U.S. Environmental Protection Agency
FAST	Functional Analysis System Technique
HEPA	High Efficiency Particulate Air
HT	Tritium in the form of hydrogen gas
HTO	Tritium water vapor
MEMP	Miamisburg Environmental Management Project
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
OPEA	Ohio Environmental Protection Agency
SARA	Superfund Amendments and Reauthorization Act

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EXECUTIVE SUMMARY

From July 29 until August 1, 2002, a Department of Energy (DOE) technical assistance team conducted a workshop at DOE's Miamisburg Environmental Management Project (MEMP), formerly known as the Mound Plant. The workshop resulted from a request by MEMP management. Its purpose was to identify the best available strategies and technologies for minimizing radioactive emissions during decontamination and demolition of five buildings at the site, which is located in Miamisburg, Ohio.

The team was assembled by the Department's Office of Science and Technology (EM-50) National Energy Technology Laboratory to assist the project under a new technical assistance initiative to help DOE sites by providing rapid and on-going access to critical experience and expertise related to closure activities. The team included seven senior, experienced professionals in the fields of nuclear facility decontamination and demolition, air dispersion modeling, and value engineering.

Background

Construction of the 306-acre Mound site began in 1947. As a DOE research, development, and production facility, Mound's work resulted in radioactive contamination of many site buildings, including the five that were the subject of this study, with a variety of radionuclides. These five buildings – designated R, SW, WD, HH, and 38 – are of masonry construction.

Present plans call for taking the buildings down and shipping the rubble off site as low-level radioactive waste. Plans call for leaving selected equipment and building components in place until they can be removed and disposed of during the building demolition. This approach is the baseline approach for study purposes.

Approach

The workshop used a formal value methods process comprised of six basic steps. Step (1) involved team review of project information and presentations by project personnel, and a tour of the Building R-SW complex. Step (2) involved brainstorming to identify ideas for alternate solutions. In step (3), the team analyzed these ideas and identified the most promising ones for further development into concepts. Step (4) entailed developing these ideas into concepts and reasons why they would offer advantages over the current approach. The concepts were further condensed into major proposals. Each proposal was assigned to a team champion, who detailed the scope of the proposal. Step (5) involved a presentation by the team to site management on the results of the workshop and providing draft copies of this report. In step (6), if requested by the site, the team will be available for support during D&D work.

Expected Outcome and Criteria for Success

The site identified the expected outcome of the study as viable alternative approaches to the building D&D work that effectively control radioactive emissions to the atmosphere and accelerate the schedule. The criteria for success were alternative approaches that would help accelerate the project schedule, and are proven concepts that do not entail increased risk to the project.

Key Issues

The site is removing the buildings to make room for development of the property into an industrial park because the buildings are not considered usable in the industrial park environment. A key issue in this process is to limit radioactive air emissions in accordance with federal regulations, which is especially challenging at this site due to lack of a buffer zone and to the process of turning site property over to the community which is already underway.

Ideas Identified

The team identified a total of 76 ideas that might have merit in improving the site process.

Analysis of Ideas

The team grouped these ideas into categories for further study and analyzed them for potential benefits. This process led to the team's proposals.

Team Proposals

The team recommends that the site consider the following ideas. The team considers that the site already has a good, well-developed strategy for the D&D work, and understands that the site has considered or is planning to implement most of these ideas.

- Refining calculations of projected radiation doses from offsite emissions, and use of near-real-time emissions data to promptly determine actual doses.
- Comprehensive characterization of the buildings, making use of proven, innovative characterization techniques.
- Use of partial or full containment tents during building demolition, with ventilation exhaust directed through the 61-meter stack.
- Use of proven, innovative technologies for size reduction and radioactive waste packaging.
- Considering other strategies and lessons learned in other D&D projects for possible application at the site.

A more-detailed summary of these proposals appears in Table 1 on the next page.

The Path Forward

The team requests that the project consider the proposals and determine what areas warrant further study in the interest of improving the building decontamination and demolition plan. The team stands ready to assist in this effort and to provide other help with the project as requested by the site.

Note that BWXT management reviewed a draft copy of this report for factual accuracy, and their input was incorporated into this final version.

Table 1. Summary of Proposals

1. **Refined Emissions Dose Calculations and Near-Real Time Monitoring**

   This would involve characterizing soils to produce a more realistic source term for the particulates released from soils, and refining the tritium ingestion scenario.

   In regard to near real time monitoring of emissions, the team considers that D&D work could proceed as scheduled initially, without implementing more than minimal fugitive emission controls. Offsite dose monitoring information would be collected and tracked on a weekly to monthly basis. If actual dose monitoring shows that levels are acceptable, the site could continue work as scheduled and perhaps move future year work forward.

2. **Comprehensive Characterization**

   Further characterization efforts would be weighed against the needs of emissions assessments. If the emissions estimate is found to be too conservative and adjustments to the estimate are made, additional characterization effort related to demolishing the R-SW facility may be substantially reduced. The team recommends that several sources of demonstrated or evaluated technologies be reviewed to assure that the most effective and efficient technologies are being used.

3. **Using Containment Tents With Ventilation Though the R-SW Stack**

   As an alternative or back-up to the completely "open air" approach, it is recommended that large tents and directed venting be used where appropriate to contain emissions as dismantling of the contaminated building progressed; only selected areas would be tented.

   However, it is recommended that open air demolition be done without tents, unless it can be shown that significant schedule reduction can be achieved through the use of tenting. But if emissions from D&D operations are expected to exceed the annual dose limit at the site, then strong consideration should be given to full or partial tenting options.

   It is also recommended that specialized use of tents be considered when dismantling the Old Cave and during waste handling and disposal operations at the waste staging area.

4. **Using Proven, Innovative Technologies For Size Reduction and Waste Packaging**

   The team recommends that that the site consider using appropriate innovative size reduction technologies listed in Appendix E. Regarding waste packaging, the team recommends packaging radioactive waste inside buildings to the extent practicable and using intermodal containers and soil sacks to promote efficiency. Wastes that are large and have an irregular shape could be packaged using the Instacote process.

   The team recommends methods for reducing dose resulting from the staging area, such as delay of the property transfer of Phase 3.

5. **Considering Other Strategies and Lessons Learned in Other D&D Projects**

   The team recommends following a carefully-thought-out sequence for building demolition, and a process for sequential completion of the final status surveys and the related report which could save time during the final stages of the project. The team provided information on other D&D projects using different approaches, and encourages the site to consider lessons learned in these projects, if this has not already been done.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to describe the results of a technical solutions workshop held at the Department of Energy's (DOE) Miamisburg Environmental Management Project (MEMP), formerly known as the Mound Plant or Mound Laboratory.

Personnel from the Battelle-Columbus Laboratories Decommissioning Project participated in the workshop, and the results produced may prove useful at that site n the decommissioning of the JN1 Hot Cell Facility. The general approaches and processes described herein may help other sites as well.

The workshop focused on controlling radioactive emissions during building decontamination and demolition (D&D). Its primary purpose was to identify the best available strategies and technologies for minimizing emissions during decontamination and demolition of five radioactively-contaminated buildings at the former Mound Laboratory in Miamisburg, Ohio. Appendix A describes the workshop strategy and agenda.

The workshop took place from July 29 to August 1, 2002. The primary participants in the workshop were members of a technical assistance team assembled by the Department's Office of Science and Technology (EM-50) National Energy Technology Laboratory. This team included seven senior, experienced professionals in the fields of nuclear facility decontamination and demolition, air dispersion modeling, and value engineering. Participating in the workshop on a part-time basis were personnel of the MEMP contactor, BWXT of Ohio, Inc. Appendix B contains a list of workshop participants.

This technical solutions workshop was the second technical assistance visit in a series technical solution activities being undertaken by EM-50 as part of an initiative to help the Department's sites with closure activities. Such technical assistance visits are intended to provide rapid and on-going access to critical experience and expertise in areas such as characterization, decontamination and demolition, and waste management.

1.2 Scope

The workshop's scope was defined in a request for assistance made by project management summarized in Appendix C. This scope of work indicated that five buildings were to be considered:

- Buildings R and SW, both contaminated with tritium, plutonium, thorium, and other radioactive contaminants

- Buildings WD, HH, and 38, which are contaminated with plutonium and other radioactive contaminants

The scope of work also summarized the current approach to D&D of these buildings. This approach entails taking the buildings down and shipping the rubble off site as low-level radioactive waste. A new site D&D plan calls for leaving selected equipment and building components in place until they can be removed and disposed of during the building demolition phase. This approach is considered to be the baseline approach for the purposes of this study.

Noting the location of the MEMP in a residential area, and efforts underway for turning the site into an industrial park, project management emphasized the importance of using a D&D process that effectively stabilizes, fixes, and contains the radioactivity to ensure the safety of the public and of private industrial operations being located at the site. The project requested the team to:

- Recommend the most effective method of using commercial approaches for demolishing these buildings that could improve the current approach and allow for an effective balance between project acceleration and regulatory compliance objectives.
- Recommend how to combine risk-reducing approaches to be performed at different times during the remediation process, and
- Address the proper cleanup criteria to meet during building demolition the requirements of the National Emissions Standards for Hazardous Air Pollutants (NESHAPS) developed by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act, Code of Federal Regulations 40 CFR 61 Subpart H (reference 1). The project noted that it plans to use the computer software package CAP88 (reference 2) as an air dispersion model to demonstrate compliance with NESHAPS radioactivity emission requirements, and that this software may inappropriately overestimate radiation dose from tritium emissions.

The scope of work also identified five specific problem areas to be addressed by the team:

- The tritium release factor for use in CAP88 calculations,
- Regulator/ NESHAPS interpretation of cleanup criteria for nuclear facilities,
- Reducing fugitive emissions before or during demolition,
- Improved demolition techniques/technologies, and
- Methods of detection to demonstrate compliance with NESHAPS requirements during building demolition.

1.3 Approach

Prior to the workshop, the technical assistance team reviewed background information on the MEMP and the issues associated with building D&D. The workshop amounted to a value study. It used a formal value engineering methods process comprised of six basic steps.

(1) Information Phase

This phase began approximately one month before the workshop when the technical assistance team was provided a packet of information about the MEMP and the problems to be addressed. The onsite part of the information phase took place on July 29 and July 30. It began with site presentations on the problems related to controlling radioactive emissions during building D&D work and the current plans to resolve these problems.

Following these presentations the team members toured the subject buildings. The team then used function analysis to discuss and reach consensus on three key issues: (1) what is being done, (2) why it is being done, and (3) how it is being done. This information appears in Section 5 of this report.

(2) Creativity Phase

The team used "focused brainstorming" techniques to identify and list various ideas for possible alternative solutions. These ideas were merely listed without discussion or criticism. The list of ideas appears in Section 6.

(3) Analysis Phase

During this phase the team discussed the ideas. The team identified ideas which merited further consideration. After determining whether they met all established criteria, the team ranked the ideas with most potential using a paired comparison technique. After this was done, the team informally discussed some of them with project personnel to ensure that there were no reasons why a particular alternative should not be pursued. Section 7 describes these ideas and how they were ranked.

(4) Development Phase

The team then developed the ideas which showed promise as much as practicable within the available time, identifying reasons why they would offer advantages over the baseline plan and how they could improve the baseline lifecycle cost and schedule. This information appears in Section 8 of this report.

(5) Presentation Phase

The presentation phase involved a presentation by the team to site management on the results of the workshop and providing draft copies of this report. A list of presentation attendees appears in Appendix D.

(6) Implementation Phase

In the final phase of the process, if requested by the site, the team will provide further technical assistance during D&D, including helping improve control of radioactive emissions during building D&D work.

1.4 Background

As the MEMP moves forward toward site closure, various site nuclear buildings are being decontaminated and demolished. This activity and environmental restoration of the site property are being performed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (reference 3), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (reference 4).

Figure 1.1 Miamisburg Environmental Management Project, Aerial View

In 1990, DOE and EPA signed a Federal Facility Agreement for the Mound site. In 1993, the Ohio Environmental Protection Agency (OEPA) also became a signatory to the Federal Facility Agreement. Under the CERCLA and the agreement, both EPA and OEPA independently review and oversee the MEMP.

The CERCLA program at Mound operates in conjunction with DOE's environmental restoration program. Under these programs, the site must comply with all applicable federal environmental laws, including the Clean Air Act.

Site History

The 306-acre Mound site is located in Miamisburg, Ohio, approximately 10 miles south-southeast of Dayton. Construction of the site began in 1947. As a DOE research, development, and production facility, Mound's main function was to manufacture nuclear and non-nuclear components for nuclear weapons.

Mound also manufactured compact radioisotope power sources used in the nation's space program. Plutonium-238 was used extensively for this purpose. Other radioactive materials were also used, including plutonium dioxide and polonium-210. In the mid-1950s, several programs involving tritium were instituted at the site and the site developed extensive capabilities for handling and studying tritium and tritium compounds.

One or more of these radioactive materials were used in the five buildings that were the subject of this study.

R (Research) Building

Constructed in 1948 and located on the main hill part of the site, Building R consists of a single-story structure with a penthouse, constructed of concrete block with a brick facing. The total floor area is 55,006 square feet. The roof consists of metal with a built-up coal tar membrane. The building penthouse contains a high efficiency particulate activity (HEPA) filter bank and associated ductwork connecting it to the T-West stack.

The building was divided into two areas. The hot side included areas used for tritium recovery, rooms in which plutonium work was done, and rooms used for analytical support activities. On the cold side of the building were research and development laboratories, analytical laboratories, a respirator fitting facility, offices, and a library.

Mound Technical Manual MD-22153, *Mound Site Radionuclides by Location*, (reference 5), lists radioactive materials used in each room of R Building. Besides plutonium, radionuclides included H-3, Po-210, U-238, and many others. Building R is physically connected to Building SW so the two structures are being treated on a single complex for D&D purposes.

SW (Semi-Works) Building

Building SW is a two-story structure, also with a penthouse, and also constructed of concrete block with brick facing. The roof consists of a built-up membrane formed of carboline, asphalt, and coal tar. Located in the main hill area, the building has a total area of 43,066 square feet. It was constructed in 1950 and eventually included 13 additions.

Building SW was used for tritium recovery and purification, tritium component development, component evaluation, and analysis of materials.

Figure 1.2 Site View Showing R-SW Complex and Stack

It was also used for research projects involving plutonium, actinium, radium, uranium, thorium, and lding contains a ventilation system with HEPA f ha and beta hot drains.

Building R-SW Stack

Underneath Room SW-19 of the SW Building lies the "Old Cave." In this area radioactive equipment was entombed.

The Action Memorandum for the SW Building (reference 6) describes eight safe shutdown activities for Building SW. These entail shutdown of systems and areas, decontamination and radioactive equipment removal.

WD (Waste Disposa ilding

Building R-SW Complex

Building WD b and served as the central facility for treatment of liquid radioactive wastes at Mound. In 1967, a beta waste treatment system began operation in the building. In 1996, an annex to the building was constructed for treatment of alpha waste.

Reference (5) shows that a wide range of radionuclides were used in the building, including tritium and various uranium and plutonium radionuclides.

Figure 1.3. WD Building

HH (Hydrolysis House) Building

One of the early buildings on the site, Building HH was initially used for the hydrolysis of highly-radioactive bismuth chloride and aluminum chloride solutions. In 1963, building HH was converted for use with stable gaseous isotope separation processes.

Figure 1.4. HH Building

Reference (5) shows that a wide range of radionuclides were used in the building, including tritium. Site personnel reported that radioactive contamination levels in this building were lower than in the other four buildings of interest.

Building 38 (Also known as PP or Plutonium Production Building)

Complete in 1967, Building 38 was used primarily for processing plutonium-238 dioxide. It contained two glovebox lines and various other equipment used in the processes.

The lower part of the two-story building is constructed of reinforced concrete, the upper part of concrete block. Total floor area is approximately 44,000 square feet.

Building 38 is scheduled to be the first of the five buildings of interest to be demolished. As of February 2002, reasonably complete characterization information was available. Some contaminated equipment remained in the building at that time, including F-Line gloveboxes. Two gloveboxes contained contamination levels exceeding 3.3×10^6 dpm/100cm^2. A 10,000-gallon tank contained sludge with 0.23 Ci of Pu-239. Fixed alpha contamination was present on some floor areas, and five areas in the building were posted as contamination areas; removable contamination levels in other areas were well below control limits. Filter banks and ventilation exhaust ducts were known to be highly contaminated.

1.5 Organization of this Report

The report organization generally follows the sequence of the six-step value methods process. Section 2 first summarizes requirements related to radioactive emissions during the D&D work and briefly discusses examples of different approaches to D&D of buildings contaminated with plutonium and tritium. Section 3 explains the expected outcome and criterion for success as identified by the site. Section 4 summarizes the key issues involved. Section 5 summarizes the ideas identified by the team and Section 6 explains the results of analysis of these ideas. Section 7 shows how promising ideas were developed. Section 8 outlines the team's proposals and the reasons for them. Section 9 discusses the path forward. References are listed in Section 10.

Additional supporting information developed during the study is being made available to the site separately from this report.

2.0 EMISSION REQUIREMENTS AND DECOMMISSIONING

2.1 Emission Requirements

Federal regulations related to release of radionuclides to the environment during processes such as contaminated building D&D are promulgated by the EPA. These regulations, which appear in 40 CFR 61.90 through 40 CFR 61.103, require monitoring radionuclide releases at all release points and limiting resulting doses to any member of the public to a maximum of 10 millirem per year total effective dose equivalent

The EPA has approved the use of three radiation dose assessment computer codes to demonstrate compliance with these NESHAPS requirements. One of these is CAP88, which MEMP will use as an air dispersion model.

The original CAP88 code was developed jointly by EPA and DOE's Oak Ridge National Laboratory for use on a mainframe computer. Later versions were developed for personal computers (CAP88-PC) and use of these was also approved by EPA.

The CAP88 code models the behavior in the atmosphere of many radionuclides, including tritium. The code assumes that all releases of tritium occur in the form of water vapor (HTO). Even though a release may occur in hydrogen gas form (HT), the regulation does not allow converting HT to an equivalent quantity of HTO. This situation results in conservatism for HT releases because metabolism differences between HT and HTO make the radiation dose associated with inhalation of HT much smaller than the dose from inhalation of an equivalent amount of HTO.

2.2 Approaches to Decommissioning

Mound Technical Manual MD-22153 (reference 5) lists the radionuclides used in each room of each building at Mound.

Limits For Radioactive Contaminants

To decontaminate and release radioactively-contaminated buildings such as those at MEMP from radiological controls, residual radioactivity must meet certain requirements. In the DOE community, the surface radioactivity limits of DOE Order 5400.5 *Radiation Protection of the Public and the Environment* (reference 7) are generally used for this purpose.

In the DOE community, there are no generally approved limits expressed on a mass or volume basis for materials contaminated in depth. Such limits for soil, foundations, or structures that may be occupied after cleanup can be derived by computer modeling using residual radioactivity computer codes such as RESRAD and RESRAD-BUILD, but specific DOE approval would be necessary to utilize the derived limits (derived concentration guideline levels) on a nuclear facility decommissioning project.

The Action Memorandum for cleanup of Building, R, SW, and 58 and 68 slab removal (reference 6) provides cleanup objectives for these facilities. Among the values specified are the following radioactivity concentrations in soil: Pu-238 55 pCi/g, Pu-239/240 55 pCi/g, and H-3 235,000 pCi/g.

Examples of Decommissioning Approaches

The current approach to D&D of the MEMP buildings is, or course, one of several approaches that may be used when a contaminated facility, or the property on which it lies, is to be released from radiological controls. During the study, the team considered other approaches that could reduce radioactive emissions. The projects summarized below provide examples of other approaches.

Building 779 at the Rocky Flats Environmental Technology Site

Building 779 was a concrete block structure with reinforced steel columns, with a floor area of 68,000 square feet. Plutonium and uranium were the primary radiological contaminants. The report of the April 2002 EM-50 technical assistance team review of plans for demolition of Building 776/777 at Rocky Flats (reference 8) summarizes the Building 779 project as follows:

The Building 779 work was conducted under a state-approved decommissioning operations plan. After equipment removal, a hydro lasing system was used to decontaminate contaminated concrete surfaces. This system proved to be effective on poured concrete and concrete block. It had also been used to decontaminate areas in other site buildings, such as Building 371.

The decontamination effort allowed a significant amount of concrete in Building 779 to be released from radiological controls, although most interior walls were treated as low-level radioactive waste. The criteria used for unrestricted release was surface contamination not to exceed an average of 100 dpm/100 cm^2 total alpha, with no more than three times that amount in hot spots.

Final surveys of the building followed guidelines of the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG-1575, (reference 9) to demonstrate that the requirements of DOE Order 5400.5, were satisfied. The final status survey plan was approved by the Department, the state of Colorado, and the EPA.

After completion of the final surveys and related independent verification surveys, Building 779 was released from radiological controls and demolished using conventional methods. Because the structure had been released from radiological controls, there were no issues with radioactive emissions during the demolition process.

The Hot and Cold Laboratory at the Barnwell Nuclear Fuel Plant

As described in reference 10, this reinforced concrete structure contains 17,000 square feet of floor space on three levels. Its 16 laboratories and 37 gloveboxes were contaminated with plutonium and natural uranium. Plutonium contamination in several gloveboxes exceeded 10^{10} dpm/100 cm^2. Floors and walls of some laboratories contained significant levels of fixed plutonium contamination.

Because the old plant was being turned into an industrial park at minimum cost, the laboratory building was decontaminated, released from radiological controls, and left standing. The contractor used the RESRAD-Build computer code to model residual radioactivity in the facility, based on a cleanup limit of no more than 15 millirem per year from residual radioactivity. The resulting derived concentration guideline level used in the cleanup was 130 dpm/100 cm^2 total alpha-emitting transuranics, which equated to 9 pCi/g plutonium in concrete.

Following removal of radioactive equipment and decontamination of the facility surfaces, the contractor performed final status surveys following the MARSSIM process (except the number of measurement was based on experience and professional judgment, rather than on MARSSIM statistical tests). Close coordination between the contractor and the regulator (the state of South Carolina) resulted in the last independent verification surveys of the building being completed about two weeks after the last contractor surveys. The plant radioactive materials license was terminated shortly afterwards, and the property turned into the South Carolina Advanced Technology Park.

Because decontamination took place under close controls which included HEPA-filtered ventilation systems, there were no issues about radioactive emissions during the D&D process. More information on this project can be obtained from Jim McNeil at 843-740-3946.

Building 232-F at the Savannah River Site.

Building 232-F, the old tritium facility at the Savannah River Site, became the first full-scale tritium facility decommissioning in the DOE complex (reference 11). This work took 30 months to complete.

During this project, the contractor encountered difficulties in characterizing materials, especially concrete, for tritium. Additional characterization of the concrete structure, including numerous surface and core samples analyzed in a laboratory, was necessary during the course of the work. More information about this project can be obtained from Bill Austin of Westinghouse Savannah River Company at 803-725-4543 or Rod Rimando of DOE-Savannah River at 803-725-4118.

3.0 ANTICIPATED OUTCOME AND CRITERIA FOR SUCCESS

The presentations made by project management and technical personnel, and subsequent discussions with site personnel, included the following information:

3.1 Anticipated Outcome

The anticipated outcome of the study are viable alternative approaches to the building D&D work that effectively control radioactive emissions to the atmosphere and accelerate the schedule .

3.2 Criteria For Success

The principal criteria for success are alternative approaches that reduce radioactive emissions while maintaining an appropriate balance between project acceleration and meeting regulatory objectives. That is, the alternatives must enable emission requirements to be achieved, and be faster, and if, possible, less expensive than the baseline plan. Alternatives should also be proven concepts that do not entail increased risk to the project. They should focus mainly on accelerating the closure schedule. And if, possible, they should reduce costs.

3.3 Additional Information Provided

The study should focus primarily on the Building R-SW complex, with alternative approaches for that structure being considered as also appropriate for the other subcontracted building projects. The Old Cave in the SW building should be included in the study.

The site schedule calls for completing all D&D work by September 30, 2006. Following this event, the last of the site property will be turned over to the community for use as an advanced industrial park. This turnover process is already underway and some 30 private businesses with approximately 300 employees are presently located at the site.

This situation makes the site much different from a radioactive air emissions standpoint than large DOE sites with wide buffer zones around their radioactively-contaminated facilities, and influences Mound D&D strategy. Projections for radioactive air emissions from D&D work, calculated with the CAP88-PC code using available characterization data, are used to ensure that site stays well below the annual NESHAPS limit of 10 millirems per year at the site boundary, presently defined for stack emissions as a single point 880 meters north-northeast of the operational stack.

Using a risk-based strategy based on projected air emissions, the site schedules and manages work so that radioactive emissions from individual D&D projects would produce no more than one to two millirems per year. Site personnel indicated that plutonium is expected to be controlling in the air emissions, rather than tritium. Radioactive does from annual total site emission projections range from 4.88 millirems in 2003 to 12.89 millirems in 2004. The site is working on ways to cut the projected 2004 emissions down to around five millirems for the year. Following NESHAPS requirements, the site obtains EPA Region V approval of processes projected to produce more than 0.1 millirem per year, such as the demolition plan for a contaminated building.

The precision of the air emission calculations is presently limited by the available characterization data. The site recognizes this situation and is presently performing additional characterization work, including analysis of concrete samples.

The site measures radioactive air emissions in several ways. These include continuous monitoring stack emissions, using perimeter and offsite monitors, and environmental sampling. The site will also measure air emissions near buildings being demolished.

Another factor that influences site D&D strategy is annual funding. The site balances workload year to year to stay within projected annual funding limitations.

The five buildings of interest in this study represent the most significant site buildings to be decommissioned. The site considers D&D of the Building R-SW complex to be longest building D&D path to closure. This conclusion in based on the size of the complex – approximately 100,000 square feet of floor area – along with the numerous contaminated areas, the relatively large amount of contaminated equipment in the buildings, and the presence of the Old Cave entombment. All building equipment, even unused gloveboxes, is being treated as potentially contaminated.

The present site strategy of taking down the buildings without first releasing them from radiological controls evolved from efforts to cut time and cost for the closure process. Before developing this strategy, the site was facing a 2009 closure date and substantially higher costs.

Relatively small low-level radioactive waste disposal costs help make this approach economical. The site plans to ship this waste to DOE's Nevada Test Site and to Envirocare of Utah. The site considers that it has enough characterization data on the facilities to conclude that it is faster and less expensive to take the buildings down as contaminated, rather than first release them from radiological controls. (The team understands that Building HH may be released from radiological controls before demolition because contamination levels in that building are very low.)

The site plans on following a two-phase strategy. In phase 1, the building structures are being taken to ground level. In Phase 2, the floor slabs, foundations, contaminated subsurface piping, and contaminated soil will be removed.

With the site's strategy of taking the buildings down contaminated, the extent of radioactive equipment removal and decontamination of building surfaces is dictated primarily by reducing the source terms and projected radioactive air emissions, rather than by specific limits on surface or volumetric contamination in the structures. As noted previously, the site has established limits for radioactivity in soil that appear in reference (6).

The site plans to use several proven techniques to reduce radioactive emissions during the demolition process. These include use of fixatives, water misting to reduce dust, and promptly placing radioactive waste in containers.

Over the past few years, the site has been using site workers for D&D work. For example, in Building 38 site workers removed the A-Line gloveboxes, which were contaminated with plutonium, and other radioactive equipment. Site workers have done considerable D&D work in the R-SW complex. But projections have indicated that the present site contractor workforce is too small to accomplish all the necessary D&D work. So the site is subcontracting demolition of the Buildings 38, WD, and HH to experienced, pre-qualified D&D companies.

Building 38 is the first of the contaminated site buildings for which building demolition will be subcontracted. The subcontractor is currently making preparations for the project. Subcontractor work in Building 38 is expected to include removal of some radioactive equipment such as the F-Line gloveboxes and ventilation exhaust equipment and HEPA filters.

Site workers will continue decontamination and removal of equipment from the Building R-SW complex and eventually demolish the structures. The site will keep the exhaust ventilation fan house next to the buildings and the associated stack operational as long as practicable, to enable emissions from the decontamination process to be released through the stack. (Most gloveboxes in the Building R-SW complex are already venting through the stack.) Demolition of this building is expected to be completed in August 2005. Site personnel have considered the experience with D&D of Building 232-F at the Savannah River Site, the largest tritium facility decommissioning project yet undertaken in the DOE complex.

4.0 KEY ISSUES

The team discussed information provided by the site, looked at the Building R-SW complex, and agreed that the key issue in the project is limiting radioactive air emissions during the building demolition. As a result of the initial site meetings, the team identified key issues, such as:

4.1 What is Being Done?

The site is removing the five buildings.

3.2 Why is this Being Done?

The site is removing the buildings to make room for development of the property into an industrial park because the buildings are not considered usable in the industrial park environment and because they take up space needed for the park development, and to eliminate future risk to people and the environment..

3.3 How is this being done?

The site is removing radioactive materials and equipment from the buildings, performing limited decontamination of the building structures, demolishing the structures, and disposing of the building rubble as low-level radioactive waste.

3.4 Other Issues

Other issues identified by the team during the course of the workshop included:

- Asbestos issues, such as floor tiles to be removed,
- Whether a projected dose on 0.29 millirem for air emissions was mitigated or unmitigated,
- The tight project schedule,
- That the R-SW complex could be the critical path,

- That the site lacks as-built drawings of the buildings,
- Whether the presence of lead paint is an issue, and
- The contribution to projected emission dose from tritium.

5.0 IDEAS IDENTIFIED

The team identified 76 ideas for alternative solutions as listed in Table 4.1. These ideas were initially grouped by the team as indicated.

Table 5.1 Initial Ideas for Solutions

No.	Idea
	Limiting Emissions (Containment)
1	Tent and recirculate and filter
2	Fix/encapsulate contamination using foam, poly, and grout
3	Build enclosure for staging area
4	Spray/misting/fogging technologies for ducts, etc.
5	Vacuum strippable coatings
6	AEA Portable Tent with strippable coating or liner
7	Inject foam into piping
8	RL encapsulation technology (linseed oil) (a durable fixative)
9	Containment walls, sleeving, trenches, sheeting, chemical grout
10	Drop dust retardant just before wall or ceiling collapses
11	Air sampling (using vacuum) after a few hours to verify effectiveness
	Limiting Emissions (Characterization)
12	Perform more detailed characterization (lower emission projections)
13	Deploy portable lab
14	Use truck x-ray or x-ray fluorescence to look inside walls
15	Use ICAM imaging system (West Valley Demonstration Project)
16	Develop real-time emissions monitor for asbestos
17	Provide near real-time emissions monitoring
18	Pick up air monitoring data monthly/increase frequency at fence line
19	Maximize use of non-intrusive characterization tools
20	Use of on-line alpha spectroscopy air monitoring instruments
21	Use DDROPS technology from INEEL for "what-if" analysis
22	Develop real-time dose banking system
23	Obtain more data on asbestos, PCBs, and lead
24	Deploy PCB analyzer and lead paint analyzer

No.	Idea
25	GammaCam application
26	ISOCS room analyzer
27	Long range alpha detectors (LRAD)
28	Rad-elect (hockey pucks) stick-on walls
29	On-line alpha spectroscopy instruments (duplicate)
30	Supplement characterization – look for hidden contamination
31	Mid-year under building characterization (Hanford 105-C project)
32	Use Pipe Explorer (SEA) for ducts and piping
Limiting Emissions (Other Options)	
33	Omitted
34	Consider free releasing and leave standing buildings (38, WD, HH)
35	Put past experience in report, e.g., Building 232F at the Savannah River Site
36	Prepare final status survey report area by area for regulators to review ASAP
37	Don't move fence line until ready
38	Reassess assumptions in emissions model/be less conservative
Limiting Emissions (Process Improvements)	
39	Work from the end point back
40	Do nothing. Demolish and monitor only change if necessary
41	Portable tritiated water removal unit
42	Fix contamination and drop structure
43	Use elephant trunk vent to stack
44	Place concrete and soil in soft-sided containers
45	Develop overall plan of attack for demolition to minimize emissions
46	Reduce time of waste in staging area; ship as generated
47	Containerize waste at D&D site, not at staging area
48	Remove slab and mine out the soil while R-SW building still standing
49	Leave ventilation system in-place during D&D to minimize emissions
50	Limit work on windy days; set wind limits during D&D
51	Use portable tritium water removal system (duplicate)
52	Shut off power and use portable electrical energy sensor

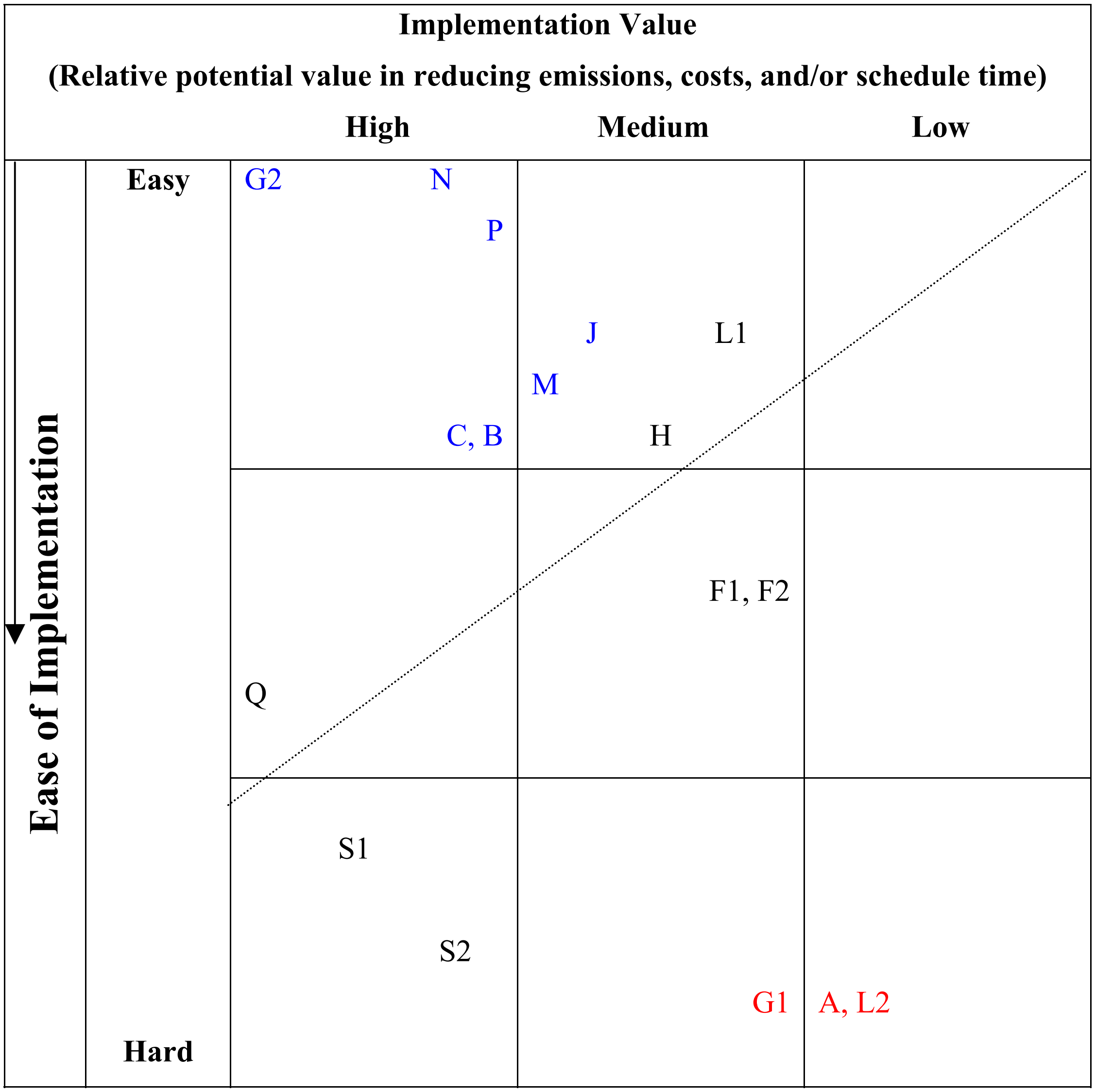
No.	Idea
53	Use CAP88 PCT (Berkeley) before and after comparison
54	Use vacuum collection systems during cutting and demolition
55	Establish guidelines for equipment sources that can remain in building
	Limiting Emissions (Risk)
56	Relocate staging area for D&D operations
	Demolition of Building (Cutting, Size Reduction, and Demolition)
57	Use diamond wire saw with water
58	Strategic use of explosives
59	Hammer drill (characterization included)
60	Hammer head attachment
61	Use shear mounted water misting
62	Use explosives inside/outside tent (considering 0.29 millirem annual dose)
63	Deploy real-time monitor for presence of electrical power (duplicate)
64	DDROPS cutting plan (INEEL)
65	Obtain copy of *Cutting & Size Reduction* white paper
66	Deploy the Universal Demolition Processor
67	Pipe crimping and drain plugging
68	Integrated Technology Suite and use of ISOCS
69	“Son of” WARTHOG
70	Deploy soft-sided containers
71	Take out slab while building is still in place
72	Use Instacoat for oversize loads of debris
73	In-situ soil verification, volatile organic compound stripping
74	Trench or sheet piles to contain secondary water
75	Inject chemical grout to retard soil absorption of contaminants
76	FIU cutting saws & dust suppression systems

6.0 ANALYSIS OF IDEAS

The team discussed each of the ideas listed in Table 5.1. The team determined that the ideas shown on Figure 6.1 on the next page would likely meet the criterion for success described in Section 4. Note that this conclusion was not based on the implementation cost necessarily being lower, because time did not allow for development of detailed cost estimates for ideas which showed promise at this point in the process.

The team ranked the ideas based on value of expected potential reductions in risk (primarily radioactive emissions), cost and schedule time. The team also ranked them in terms of perceived relative ease of implementation. These rankings determined the position of each idea on the Figure 6.1 graph. Ideas showing the most promise, i.e., those which appear in the upper left portion of the figure, were selected for further development.

The team later informally discussed these ideas with MEMP project team members to determine whether there were any reasons why they were not viable. The project team's input was taken into account in selecting the ideas which led to the proposals presented in Section 8 of this report.



Key to Graph:

A. Soil Treatment Technologies
B. Cutting and Size Reduction during demolition
C. Applicable Characterization Tools
F1. Application of Model Analysis
F2. Performing Model Planning
G1. Soil Protection (Active)
G2. Soil Protection (Passive)
H. Experience Review
J. Electrical Safety Sensor
L1. Fixatives
L2. Destructive Demolition
M. Using Real-time Monitoring Data
P. Packaging and shipping options
N. Tent and Vent
Q. Alternative Strategic Approaches
S1. Performing Asbestos abatement with D&D
S2. Leave fence line out to buy time
Scoring -Blue: High, Black: Med., Red: Low

Figure 6.1. Graph Used in Idea Comparison

7.0 DEVELOPMENT OF IDEAS

The team developed the ideas shown in Figure 6.1 considering potential benefits, potential advantages, and possible risks to the project. Tables 7.1 through 7.5 provide examples of this process.

The team also developed information on potential net savings which could come from implementation of the ideas. These potential savings are discussed in Section 8 of this report. The details of the costs savings estimates are being provided to the site separately from this report.

Table 7.1. Concept No. 1a, Calculating Emissions, Modeling Tritium Ingestion

<table>
<tr><td>COMPONENT: Modeling</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">Be less conservative in CAP88 dose assessments: model tritium ingestion more realistically.

The present CAP88-PC dose is based on a maximum distance of 1490 meters, which means that the model assumes that all food is grown at that distance or closer, and does not consider food grown at greater distances with much less contamination. It would be more realistic to extend the food growing area out to 80 kilometers (50 miles). Doing so will probably lessen the dose from tritium by a factor of three, as the ingestion dose now comprises two-thirds of the dose from tritium. This should drop the total dose to about 2/3 of 0.29, or 0.20 millirem.

The actual values in the CAP88-PC assessment for tritium were as follows: ingestion 7.12 e-4, inhalation 3.32e-4.

The tritium contribution to total dose of 0.29 mrem for RSW is about 50 percent. After the transfer of the parking lot, the dose will become 0.9 millirem.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• The total dose from tritium may drop by a factor of 3, as ingestion will no longer be the dominant pathway.</td><td>• This will only affect the tritium component of the dose, which may not predominate (currently the tritium component is about half or 50 percent). If the tritium component drops in significance, tweaking the ingestion dose may not be worthwhile.</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">Obtaining EPA approval for revised modeling. Note that EPA used the suggested methodology in their own CAP88 dose estimates for the NESHAPS rulemaking (per Barry Parks, author of CAP88-PC).</td></tr>
</table>

Table 7.1b. Concept No. 1b, Less Conservation in Emission Calculations

<table>
<tr><td>COMPONENT: Dose assessments</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">Be less conservative in CAP88 dose assessments: get a more realistic estimate of the activity in soil, and also get a better estimate of the release fraction.

While the understands that the planned characterization is far from complete, it appears that the dose estimates from releases of contaminated soil are based on upper bound estimates rather than actual measured values. Better characterization is needed, as actual values are probably less, which should lower the dose to the maximally exposed individual.

Also, the current dose estimates are based on a release fraction of 1E-3. The actual release may be less by orders of magnitude. A suggested basis would be to look at operating experience at Mound documenting difference between predicted and measured values.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• Better characterization of soil activity would lessen the maximally exposed individual dose, but it is not clear by how much.

• Release fractions based on operating experience may lower the dose by orders of magnitude.</td><td>• Costs of characterizing soils.

• Costs of analyzing release fractions from previous operations.

• The data may not be available to estimate actual release fractions.</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">The data may be available for any comparison on release fractions. EPA may not approve altered release fractions.</td></tr>
</table>

Table 7.1c. Concept No. 1c, Emission Calculations, Soil Activity

<table>
<tr><td>COMPONENT: Modeling</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">Be less conservative in CAP88 dose assessments: use a non-zero stack height. The present CAP88-PC dose estimates for SW/R are based on a zero stack height release, which is very conservative. If it is feasible to ventilate the emissions from D&D of the R-SW building through the 61-meter stack, then the off-site dose to the maximally exposed individual will drop by a factor of about 100 or greater (per CAP88-PC estimates made by Barry Parks) from the increased dispersion alone.

There will be an additional benefit in dose reduction from the HEPA filtration of particulates in the stack. This will lower the dose from plutonium, which is a particulate, but will not affect the dose from tritium, which is not a particulate.</td></tr>
<tr><td>BENEFITS</td><td>DISADVANTAGES</td></tr>
<tr><td>• Dose from all radionuclides (particulate and non-particulate) will drop by a factor of 100.

• Dose from plutonium will drop even further from HEPA filtration.

• The location of the MEI may move farther away. The dose to the current MEI may drop because the plume will touch down at a farther distance</td><td>• It may not be feasible to do tent/vent of D&D operations.

• The engineering costs of ventilating through the 61 meter stack.

• EPA will not give credit for HEPA filtration.</td></tr>
<tr><td colspan="2">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">This proposal assumes that it is feasible to ventilate through the 61 meter stack. This would require tenting and possibly other ventilation modifications. Time and money requirements to tent and vent may be prohibitive.</td></tr>
</table>

Table 7.1d. Concept No. 1d, Emission Calculations, Use of CAP88-PC-T Code

<table>
<tr><td>COMPONENT: Modeling</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">Use CAP88-PC-T, developed at LBNL for more accurately modeling tritium gas. CAP88-PC models tritium as tritiated water, instead of as a gas, which gives about 20,000 times more dose.

About 80 percent of tritium releases at Mound are in water form, so there would not be much advantage for this option.</td></tr>
<tr><td>BENEFITS</td><td>DISADVANTAGES</td></tr>
<tr><td>• The dose from tritium gas in CAP88-PC would drop by about 20,000 times.</td><td>• CAP88-PC-T is not yet approved by EPA and obtaining EPA approval will probably take too much time.

• Lowering the tritium dose may be easier to do by using less conservative agricultural production assumptions in CAP88-PC.

• This would only benefit the 20 percent of tritium emissions that are not as tritiated water.</td></tr>
<tr><td colspan="2">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">EPA approval will likely be time-prohibitive.</td></tr>
</table>

Table 7.2. Concept No. 2, Comprehensive Characterization

<table>
<tr><td>COMPONENT: Each building</td><td>FUNCTION: Characterization</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">A host of characterization technologies were evaluated both for their potential beneficial impact on site emissions and on the D&D of R-SW Building complex. More complete characterization might reduce overly conservative source term assumptions. If, however, parameters used in the emission model are found to be too conservative and are adjusted appropriately, further, extensive characterization may be unnecessary. The site's current use or consideration of these technologies in the R-SW Building complex were not known by the team. A list of websites describing these technologies have been provided to the site. The proposed characterization would entail three steps:
1. Perform more detailed, focused characterization to produce more accurate source terms, which would lead to lower emissions estimates (Room assessment using ISOCS, evacuate air from empty piping systems to determine contents, Hammer Drill [hollow core drill for sampling concrete]).
2. Conduct near real-time or increase sampling frequency for radiological air monitoring that would support a real-time dose banking system for emissions (constant air monitor employing alpha spectroscopy).
3. Consider the use of innovative characterization technologies (modern portable laboratory, gamma camera, electret ion chambers, Dig Face Characterization Robotic Retrieval System, Pipe Explorer, PCB/Lead Paint analyzer, ICAM imaging technology, X-ray or X-ray fluorescence imaging of inaccessible locations).
4. The team also suggests that DEF62021-EW 55094 FIU Dust Suppression Study, the characterization technologies tested by EM-50 (in Appendix E), and the Integrated Technology Suite (characterization suite used at INEEL, Fernald) be reviewed.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• These technologies may be more effective than baseline technologies.
• Could review emissions on a real-time or near real-time basis which would assure that goals and or limits are not exceeded.
• The Dig Face Characterization system could be applied to the Old Cave area for the purposes of remote characterization and retrieval. This system has already been tested and proven at INEEL and should be easily obtained for use at Mound. The technologies noted may be an improvement over selected baseline technologies.</td><td>• Disadvantages depend on geometry or physical nature of contaminants, which may or may not be known.
• Increased monitoring costs and complexity with near-real-time emissions monitoring.
• Some of the technologies may add cost and complexity.</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">• None.</td></tr>
</table>

Table 7.3. Concept No. 3, Tenting and Venting

<table>
<tr><td>COMPONENT: R-SW Building</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">As a part of the dismantlement process provide portable or one of a kind, single application tents with appropriate filters to capture or contain emissions resulting from dismantlement activities. Use of existing stacks, ventilation systems, liners, strippable coatings, portable vacuum/filter systems, and elephant trunks are included.

Three basic options are presented with this proposal: (1) use of tent and filter system for the total S, WR building, (2) partial tenting of a portion of the building (i.e., the Cave), and (3) tenting of the "staging area", in close proximity to the D&D operation.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• Portable containment systems and filters are commercially available (although lead time could be significant).

• Proposed technologies/equipment are commonly used throughout the DOE and private sector.

• Relatively inexpensive to procure and use.

• Little or no training or experience required to set up and use.

• Adds very little secondary waste to D&D operations.

• Strong stakeholder support because of its visible barrier/containment.

• Highly effective in reducing emissions.

• Contributes to reduction in annual site emissions dose.

• Keeps rain/weather out of project.

• Allows a more-aggressive schedule to remove building and equipment.</td><td>• Some additional cost over baseline open-air dismantlement. (Need estimate of current containment, emissions mitigation costs before comparative analysis can be determined).

• Modification to the baseline approach is required.

• Additional cost associated with re-design of staging area.</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">Proven technology, no standard basis risks. Small risk associated with weather events (high winds) which would require rebuilding the tent. The smaller the tent, the lower the risk.</td></tr>
</table>

Table 7.4a. Concept No. 4a, Use of Innovative Technologies, Packaging and Shipping

<table>
<tr><td>COMPONENT: R-SW Building</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">The evaluation team learned that the waste staging area will theoretically be the largest source for offsite emissions. The team suggested ways to reduce emissions associated with waste handling and packaging.

1. Package waste at buildings (in intermodal containers or soil sacks)
2. Wastes that are large and have an irregular shape should be packaged using the Instacote process, which is sprayed on but qualifies as a Department of Transportation strong, tight container
3. Reduce emissions at staging area by: (1) locating staging area to maximize distance to offsite receptor, (2) reducing the amount of time that the waste is in the storage area (move waste offsite as quickly as possible), (3) build an enclosure for staging area.
4. If feasible, the transfer of the Phase I property should be delayed to maintain the distance to the nearest receptor until the major buildings with radioactive contamination, as well as contaminated soils, are shipped offsite. Alternatively, the staging area could be enclosed and emissions filtered prior to release.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• Packaging the waste at the demolition site in soil sacks or intermodal containers would reduce overall emissions due to less handling, with associated reductions n handling costs. Instacote coating of large debris items meets Department of Transportation requirements for strong, tight containers, and would decrease release of radionuclides.
• Delay of the transfer of the Phase I property would decrease the predicted effective dose to the maximally exposed individual from the staging area.
• A tent structure over the staging area would reduce overall emissions.</td><td>• Space may not be available to package waste at the demolition site.
• Moving the staging area may not be practicable
• Enclosing the entire staging area would be costly</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">Any enclosure would be subject to damage from debris or high winds; the smaller the enclosure, the less risk.</td></tr>
</table>

Table 7.4b. Concept No. 4b, Use of Innovative Technologies, Fixatives

<table>
<tr><td>COMPONENT: R-SW Building</td><td>FUNCTION: Controlling emissions</td></tr>
<tr><td colspan="2" align="center">ALTERNATIVE DESCRIPTION</td></tr>
<tr><td colspan="2">As a part of the dismantlement process adopt the general use of sprays, coatings, fixatives, fogs, and foams as a means of capturing and fixing small particles generated during dismantlement activities.</td></tr>
<tr><td align="center">BENEFITS</td><td align="center">DISADVANTAGES</td></tr>
<tr><td>• Fixatives materials are commercially available.
• They are used throughout the DOE and private sector.
• Relatively inexpensive to procure and use.
• Little or no training or experience required to use.
• Adds very little secondary waste to D&D operations.
• Relatively effective in reducing airborne contaminant concentration.
• Contributes to reduction in annual site emission dose.</td><td>• Not 100 percent effective.
• Many varieties are available; must identify and select the most efficient, which may involve some testing.
• Would add some complexity and cost to the operation.
• Performance would depend on conditions and parameters, and could vary from place to place.</td></tr>
<tr><td colspan="2" align="center">IDENTIFIED RISKS</td></tr>
<tr><td colspan="2">Very little risk to implement. Some fogs (glucose)attract insects which may spread contamination if not controlled. Small risk of using ineffective material or process and allowing contamination spread. Care must taken to ensure that the appropriate fixative be matched to the surface being coated.</td></tr>
</table>

Table 7.5. Concept No. 5, D&D Strategies

COMPONENT: Each site area	**FUNCTION:** D&D strategy
ALTERNATIVE DESCRIPTION	
The proposed strategy contains two basic elements: **1. Building work sequence** Develop an overall plan that sequences building demolition work in a way that effectively takes into account the different contamination levels and contamination potential in the different areas, and thereby minimizes radioactive emissions. **2. Final Status Survey Report process** Prepare the Final Status Survey Report by area of the site, with different survey units and report chapters for each area. Quickly provide draft report chapters to the regulators, to facilitate speedy completion of independent verification surveys on an area by area basis.	
BENEFITS	**DISADVANTAGES**
• Effective sequencing could reduce radioactive emissions during building demolishment • The final status survey report process would facilitate turning the site over to the community faster than would otherwise be possible • It would speed up the final phase of project completion. • It would reduce costs by saving time and site overhead costs.	• None
IDENTIFIED RISKS	
• None.	

The team developed a Functional Analysis System Technique (FAST) chart to help organize the concepts and how they relate to the project objectives. A copy of this chart appears in Figure 7.1 on the next page.

Figure 7.1 FAST Chart

8.0 TEAM PROPOSALS

Based on the results of the study, the team offers the following recommendations for consideration by the site. Please note that the team acknowledges that the site has already considered most of these ideas and is planning on implementing others. The team also considers the present site D&D strategy to be well-thought-out.

Some of these proposals refer to innovative but proven technologies which might be used to advantage on the project. A detail list of these technologies, along with points of contact for more information, appears in Appendix E.

8.1 Proposal Number 1: Refining Emission Dose Projections and Near-Real-Time Monitoring of Radioactive Emissions

Background

As indicated in the title, this is a two-part proposal.

The current CAP88-PC dose estimates for D&D of the Building R-SW complex show about 0.9 millirem (after the transfer of the parking lot) to the maximally exposed individual. Evaluation of the dose estimates by subject matter experts indicate that the estimate is conservative with a high degree of confidence, given the source term provided to the team, and that the actual off-site doses will most likely be substantially less. However, the subject matter expert did not do an independent evaluation of the source term.

About half of the dose from the R-SW complex is from tritium and the other half is from particulates (plutonium, thorium and actinium). The dose from tritium is conservative in the following respects:

- The dose from ingestion of tritium assumes that all food consumed by the MEI is presumed to be produced within 1500 meters of the site. Most food would realistically be produced at further distances. A more realistic ingestion model would probably lower the tritium dose by a.factor of 3.
- All tritium is presumed to be in the form of tritiated water, but about 20 percent is gas, which has 20,000 times less dose.

Alternative models such as CAP88-PC-T which models tritium gas could be used, but getting EPA approval for new models would be time-prohibitive, and it would only lower the dose by 20 percent at the most.

The dose from particulates (plutonium, thorium, actinium) may be conservative in the following respects:

- Soil activities are based on upper-bound estimates, and soil characterization is now underway. It is likely that the actual measured values for radionuclides in soil will be less than the estimates.
- The release fractions for particulates to air are set at 1E-3 by EPA, but the actual releases are likely to be orders of magnitude less.

It might be feasible to justify more realistic release fractions based on actual operating experience, but the team is not aware of any applicable data.

One issue that came out of the evaluation is the impact of ground-level releases. If the radionuclides were released from the 61-meter R-SW stack, instead of from ground-level as is presently assumed, the dose would drop by a factor of at least 100.

Regarding near-real-time monitoring of emissions, regulatory limits require that total off-site doses from all Mound operations be limited to less than10 mllirem per year. The present schedule for D&D has been established considering resource loading as well as cost and schedule minimization. Unmitigated off-site doses associated with this work have been estimated using CAP88-PC. In a number of cases individual project element dose estimates exceed the 0.1 millirem per year project threshold, requiring that regulatory concurrence be obtained prior to proceeding with the project. In total, the yearly unmitigated doses estimates for all Mound operations are somewhat below in some years and somewhat above the regulatory limit in 2004. However, as explained in the Proposal number 1, it is expected that these estimates are considerably high. If this is correct, there is plenty of room to perform unmitigated (i.e. "open air") D&D as Mound is presently considering. However, the consequences of exceeding projected estimates can be substantial. These two factors emphasize the need for the Mound project to collect and track actual site doses with considerable frequency.

Proposal

The CAP88-PC dose estimates can be made lower by using more realistic assumptions. The first priority would be to characterize soils to produce a more realistic source term for the particulates released from soils, and the team understands that this characterization is underway now. A second priority would be to refine the tritium ingestion scenario, which should lower the dose by one-third.

The team also recommends that an evaluation of the source term be considered. The source term for tritium appeared low to one team member.

Management should be aware that the dose would be 100 times less if the D&D emissions were vented from the 61-meter R-SW stack.

In regard to near real time monitoring of emissions, the team considers that D&D work could proceed as scheduled initially, without implementing more than minimal fugitive emission controls. Offsite dose monitoring information should be collected and tracked on a weekly to monthly basis. If actual dose monitoring shows that levels are acceptable, the site could continue work as scheduled and consider the possibility of moving future year work forward. On the other hand, if actual emissions are leading to unacceptably high levels, the site would implement controls such as those contained in other proposals, and/or move D&D work to later years.

Reduced Emissions

This proposal would not reduce emissions but could lead to increased flexibility in performing D&D work. The second element, real-time-monitoring of emissions, would produce more current information for planning purposes.

Schedule Acceleration

Increased flexibility in performing work could lead to accelerating the schedule

Reduced Costs

If this proposal resulted in accelerating the schedule, costs would fall accordingly from reduced overhead.

Implementation

Implementation would involve additional characterization of soil with the attendant costs, and work by site health physicists to refine the calculations. The changes would need to be discussed with the regulators.

To implement near-real-time emissions monitoring, the site would need to changes procedures and increase efforts associated with the monitoring program to increase frequency of measurements and reporting. A system for tracking offsite doses would need to be implemented.

8.2 Proposal Number 2: Comprehensive Characterization

Background

The evaluation team understands that somewhat more than 50 percent of the R-SW characterization remains to be done. The current radioactive material holdup prevents open-air demolition of the facility due to emissions restrictions. Site critical path is limited by removing more of the radioactive material within the R-SW facility. The team further understands that concrete slab and soil contamination and contamination in the Old Cave are not included in the current 0.29 millirem offsite dose projection from emissions, which is the dose estimate associated with demolition of the R-SW facility after removal of most of the hold-up radioactive material. Additional radioactive material removal and characterization is expected, and actual characterization data is expected to result in a reduction of the emissions estimate.

The evaluation team understands that lead-based paint is known to exist in the R-SW complex, and that further characterization is necessary.

Proposal

Further characterization efforts should be weighed against the needs of emissions assessments. If the emissions estimate is found to be too conservative and adjustments to the estimate are made, additional characterization effort related to demolishing the R-SW facility may be substantially reduced. The team recommends that several sources of demonstrated or evaluated technologies be reviewed to assure that the most effective and efficient technologies are being used. These sources include the Office of Science and Technology, D&D Focus Area's web site (listing provided separately), the Integrated Technology Suite (characterization suite of technologies used at the Idaho National Engineering and Environmental Laboratory and Fernald), and links to information provided during the April 2002 technical assistance visit to Rocky Flats Closure Project provided in Appendix E.

Some specific technologies that may be helpful include:

- The use of ISOCS to estimate broad area hold up levels,
- Evacuate and analyze air from empty piping systems to determine content (Dick Meservey has experience with this method),
- Hammer drill to extract concrete samples, and
- PCB/lead paint analyzer.

Reduced Emissions

The proposal would reduce emissions, per se. Comprehensive characterization would facilitate more accurate predictions of emissions that could be released during building demolishment.

Schedule Acceleration

Both elements of the proposal could lead to accelerating the schedule depending on the characterization and air monitoring results.

Reduced Costs

If these proposals resulted in accelerating the schedule, costs would fall accordingly from reduced overhead.

Implementation

To implement the first element of this proposal, a characterization plan would be needed and the special equipment obtained. The characterization itself could take several months depending on the scope of additional effort involved.

8.3 Proposal Number 3: Tenting and Venting

Background

Conventional decommissioning would include large amounts of decontamination and removal of contaminated portions of the building before it is dismantled. However, because of the nature of the previous contamination, and the difficulty of proving clean or releasable status, the building materials would still be considered contaminated and disposed of as radioactive waste.

The team recognizes that MEMP previously used this approach and is now planning an “open air D&D” approach.

Proposal

The proposed approach would be to remove only the highly contaminated items from the building prior to starting its dismantlement. As an alternative or back-up to the completely “open air” approach, it is recommended that large tents and directed venting be used to contain emissions as dismantling of the contaminated building progressed. Because many areas of the building are already clean as a result of previous D&D activities, tenting would not be required during dismantling of much of the building. Thus, only selected areas would be tented to reduce emissions. All demolition materials would be classified as radioactive waste and disposed accordingly.

It should be recognized that tents can be supplied to cover the entire structure, or just portions of the facility being D&D'd. Rocky Flats has evaluated deploying a large tent to cover an entire structure much larger than the MEMP buildings and the related technical and economic aspects of this large scale application. In general, these large tents are considered permanent structures and thus must be built and maintained to a different set of standards than do the team’s recommended smaller, temporary tent structures.

It is recommended that open air demolition be done without use of tents, unless it can be shown that significant schedule reduction can be achieved through the use of tenting. However, if emissions from D&D operations are expected to exceed the annual dose limit at the site, then strong consideration should be given to full or partial tenting options.

In addition, specialized use of tents is recommended when dismantling the Old Cave (Option 2), and/or during waste handling and disposal operations at the waste staging area (Option 3). Use of tents might allow removal of the Old Cave to be delayed until after the building is removed. The Old Cave could then be excised under tenting using larger equipment, thus saving time.

Reduced Emissions

Use of tents with exhaust ventilation through the R-SW stack could obviously reduce emissions of particulate radioactivity and release tritium at the stack height rather than at ground level.

Schedule Acceleration

Use of tents would be unlikely to accelerate the schedule and could result in schedule delays due to lead time and installation time.

Reduced Costs

Use of tents could increase project costs.

Implementation

To implement this proposal, tents would need to be designed and procured. Tents are available from several manufacturers, including AEA Technologies. Crafts personnel would have to install the tents. Health physics personnel would need to approve their readiness and use.

8.4 Proposal Number 4: Technologies for Size Reduction and Radioactive Waste Packaging

Background

In the MEMP D&D work, a large amount radioactive equipment is being sized reduced. Likewise, radioactive waste volumes will be relatively large owing to the project strategy. Making use of the most advanced proven technologies in both areas would be beneficial to the project. This would be especially important in the waste staging areas to help reduce the relatively high projected radioactive emissions from that area.

Proposal

Regarding size reduction technologies, the team recommends that that the site consider using some of those listed in Appendix E. The team has provided to the site a "white paper" on advanced size reduction methods that could prove helpful is selecting the most cost-effective technologies.

Regarding waste packaging, the team recommends packaging radioactive waste inside buildings to the extent practicable. Using intermodal containers and soil sacks would promote efficiency.

Wastes that are large and have an irregular shape could be packaged using the Instacote process, which is sprayed on but qualifies as a Department of Transportation strong, tight container

The value study team recommends for consideration three methods for reducing emissions at the staging area: (1) locating the staging area as far as practicable from the nearest offsite receptor, (2) reducing the amount of time that the waste is in the storage area, moving un-containerized waste offsite as quickly as possible, and (3) building an enclosure for staging area.

Reduced Emissions

Adopting the waste packaging practices outlined in this proposal could significantly reduce emissions.

Schedule Acceleration

The use of advanced size reduction equipment could help accelerate the schedule.

Reduced Costs

If this proposal resulted in accelerating the schedule, costs would fall accordingly from reduced overhead.

Implementation

To implement the use of more advanced size reduction methods would require purchasing, renting, or arranging to borrow equipment from other DOE sites. Special training would be necessary for some technologies.

Implementing the waste packaging recommendations would involve obtaining soil sacks and Instacoat and revising site waste management procedures to recognize these packaging methods. Relocating the staging area or enclosing it would involve some effort and expense, assuming that a suitable staging area nearer the center of the site is available.

8.5 Proposal Number 5: D&D Strategies

Background

Efficiency of the building demolition process would benefit from careful planning and sequencing, and effective sequencing could reduce radioactive emissions.

The last stage of the project will involve final status surveys to release the property from radiological controls. These surveys would be defined in a final status survey plan. The property, after building slab and contaminated soil removal, would typically be divided into different survey units, following MARSSIM protocol. A prescribed number of measurements would be taken in each survey unit to determine whether the cleanup criteria are satisfied. The team assumes that these criteria would be similar to the objectives for residual radioactivity in soil expressed in the Action Memorandum for Buildings R, SW, and 58 and the 58 slab (reference 6).

Following measurements by the site contractor, independent verification surveys would be performed by the regulators, or by another entity on the regulators' behalf. Experience has shown that such independent verification surveys can take months to complete. This time would delay project completion and turnover of the remaining site property to the community.

Also, other sites have used different approaches in D&D of radioactively-contaminated buildings. Some examples of these different approaches appear in Section 2 of this report.

Proposal

The team recommends that the site consider implementing a two-element strategy related to building demolition and the final status surveys and the final status survey report.

The first element would be a carefully-thought-out sequence for building demolition. This sequence would entail taking down parts of the structure with the least radioactive contamination first. The rubble from this part of the demolition work would be immediately removed from the work area. Then controls to reduce emissions would be focused on the more contaminated parts of the structure as it is taken down.

The second element involves sequential completion of the final status surveys and the related report.

As one survey unit is completed, the site would quickly complete the report chapter for that survey unit and isolate the area involved. The site would complete its reviews of this chapter expeditiously, and provide the chapter in draft form to the regulators. This process will give the regulators all the site survey results in an organized form for each survey unit soon after site surveys and measurements of that unit are completed. It would also give the regulators an opportunity to complete independent verification surveys faster than would otherwise be possible.

This process has been proven effective on two large survey projects, those for Charleston Naval Shipyard and the Barnwell Nuclear Fuel Plant. In both cases, the last of the independent verification surveys was completed within two weeks of the last of the site's surveys, even though the total final survey effort spanned 18 months or more. Reference (11) describes the how the process was used on the Barnwell Nuclear Fuel Plant project.

The team also recommends that the site consider lessons learned in the other D&D projects summarized in Section 2 of this report, if this has not already been done.

Reduced Emissions

As noted previously, the first element of the strategy would reduce emissions during building demolishment. The second element related to final status survey would not affect emissions.

Schedule Acceleration

The final status survey report strategy could cut several weeks or more off the last stage of the project.

Reduced Costs

By cutting time from the last stage of the project schedule, the final status survey strategy would reduce overhead costs during this time and thereby reduce project costs. Costs of implementation of the three-pronged strategy would be relatively small. Such costs would consist of project time spent on laying out the building sequence and final status survey report strategies, and time spent discussing the latter with the regulators.

Implementation

Implementation of the first element of this strategy would be straightforward. The project team would lay out the best sequence for building demolition, something that the project team is planning on doing.

To implement the second element in the strategy, the site would need to lay out the strategy for the final surveys and compiling the report chapter by chapter. The regulators would need to be briefed on this strategy, along with plans for the final status surveys, and would need to agree to support the strategy. The community would be expected to support this strategy because it would speed up turnover of the property.

9.0 THE PATH FORWARD

On August 1, 2002, the team presented its proposals to representatives from the MEMP, including DOE and BWXTO personnel and others. Appendix D lists those in attendance. The team also provided draft copies of this report, which documents the results of the workshop.

The team stands ready to provide follow-up support to the MEMP. Site requests for follow-up technical assistance on this project should be coordinated through the DOE Headquarters technical assistance lead, Skip Chamberlain, at telephone 301-903-7248 or e-mail Grover.Chamberlain@em.doe.gov.

10.0 REFERENCES

1. Clean Air Act (CAA) of 1954, as amended, Federal Code of Federal Regulations 40 CFR 61 Subpart H.
2. CAP88, Clean Air Act Assessment Package – 1998 (available at www.epa.gov/radiation/assessmment/ CAP88/).
3. Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA).
4. Superfund Amendments and Reauthorization Act of 1986 (SARA).
5. Mound Technical Manual MD-22153, *Mound Site Radionuclides by Location*. Mound Plant, February, 11, 1998.
6. *Action Memorandum: Buildings R, SW & 58 and 68 Slab Removal Action*. Mound Plant: Miamisburg, Ohio, November 2000.
7. DOE Order 5440.5, *Radiation Protection of the Public and the Environment*. DOE: Washington, DC, Change 2, January 7, 1993.

8 *The Rocky Flats Closure Project: Demolition of Building 776/777, Visit of April 16-18, 2002*. DOE EM-50 technical assistance team, April 18, 2002.

9. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*. NUREG-1575. U.S. Nuclear Regulatory Commission: Washington, DC, 2001.
10. McNeil, Jim. "Plan Ahead, Establish Support Lines, and Be Prepared for Surprises: Lessons Learned from the BNFP Decommissioning Project." Radwaste Solutions, January/February 2001.
11. Minutes of National DOE Decommissioning HQ & Field Liaison Group Meeting, Amarillo, Texas, April 28-30, 1998. (available at www.em.doe.gov)

APPENDIX A

DRAFT STRATEGY AND AGENDA

Miamisburg Environmental Management Project
Mitigation of Fugitive Emissions During Building D & D

Technical Solutions Workshop
July 29-August 1, 2002

A four-dayTechnical Solutions Workshop using the formal Value Methods Process will be conducted at the Miamisburg Environmental Management Project (MEMP). The six- step job plan be followed in this Value Study. An implementation plan detailing potential continued involvement of the Office of Science and Technology (EM-50) in providing technical assistance and funding will be developed as the final step. An explanation of the activities in each step along with the approximate time and date they will take place is as follows:

STEP 1 **Information Phase (off-site) – July 15-29**

Approximately two weeks before the study begins, the selected technical experts will be given a packet containing extensive background information about MEMP and the problems to be addressed. They will be expected to arrive on site with a general understanding of the task to be studied.

Information Phase (on site) - July 29, 1:00 to 5:00 PM

The study will begin at 1:00 PM with the normal introductions and welcomes. This will be followed by a brief management presentation detailing the expected scope of the study, the anticipated outcome, and the criterion for judging success. Next, a detailed presentation of the problems and the current plans to resolve them would be presented by the project managers who would also answer clarifying questions from the Team. The remainder of the day would be spent touring the subject buildings.

Information Phase (cont'd) - July 30, 8:00 AM to end of Step 1

Having been exposed to the problems and the proposed technical solutions, the team will next use function analysis techniques to reach group consensus on***:1)*** *what is actually being done**; 2)** why is it being done**; and 3)** how is it being done*. The next step begins only after the Team achieves this common understanding which is a critical component of the Value Process.

STEP 2 **Creativity Phase - July 30, to completion**

After achieving consensus, the Team used *"Focused Brainstorming"* techniques to list as many ideas for possible alternative solutions as the group is capable of producing. Both conventional and unconventional ideas are encouraged. The ideas are discussed only to clarify understanding with criticism or development of the idea not allowed. The step ends when the ideas stop coming.

STEP 3 **Analysis Phase - Begin July 31 - to completion**

All ideas are next grouped and then discussed in sufficient detail for group understanding. The ideas passing the initial "ho-ho" test are then grouped, ranked, and then compared to determine if they are viable alternatives to the baseline technical approach. After verifying the potential alternative meets all established criterion, the best ideas are then ranked using a paired comparison technique. At this point, an informal discussion is normally held with the project personnel to insure there are no reasons why a particular alternative should not be pursued.

STEP 4 **Development Phase - July 31 to 10:00 AM on August 1**

The alternatives selected by the team are developed to the full extent allowed by the time available and are described in a written report. The report will describe the proposal in detail and will attempt to show why it could be an improvement over the present baseline. When possible, the Life Cycle Cost and schedule of the alternative versus the baseline will be determined.

STEP 5 **Presentation Phase –August 1 at 11:00 AM (tentative)**

The results of the study are presented to management in a close-out meeting. Team members present any alternative proposals developed for management consideration and answer any questions about the proposals, or lack of same (indicating baseline cannot be improved).

The Draft Final Report is handed out at the end of the presentation. It contains the listing of all ideas, the details of the selection process used to select alternatives, and the detailed write-up of each proposed alternative. It is expected the draft report will be nearly complete and will be issued with few modifications.

(NOTE: Previous Value Studies in OH have not contained an Implementation Plan because the outside experts were not available for continued service. However, with the new ***EM-50 Closure Site Support Program***, continued technical assistance and technology deployment funding may be made available to the site for the duration of the project.**)**

STEP 6 **Implementation Phase**

If requested by the site, the team will develop a plan for continued involvement in implementing the proposed alternatives. The plan would detail how MEMP may make use of the team technical experts or make provision for expertise from other areas or individuals. The technical support could range from interactions with individual consultants on a continuing basis, to a detail of a particular needed individual to work with the project for some period of time. Assistance in technical evaluation of proposals from others could also be provided by EM-50.

APPENDIX B

Workshop Participants

The following people participated in the MEMP workshop from July 29, 2002 until August 1, 2002.

Name	Role, Discipline and Affiliation	Telephone and E-mail Address
Cliff Carpenter	Team Leader Project Engineer NETL-DOE	304-285-4041 Cliff.Carpenter@netl.doe.gov
Sam Martin, PE, CVS	Facilitator Engineer and Certified Value Specialist SAMI	303-674-6900 smartin@value-engineering.com
Dave Eaton	Participant INEEL	208-526-7002 dle@inel.gov
Ken Kasper, CHP	Participant Technical Director Scientech, Inc.	864-235-3694 kkasper@scientech.com
Dick Merservy	Participant D&D Technology Program INEEL	208-526-1834 rhm@inel.gov
Barry Parks	Participant Health Physicist DOE Office of Science (SC-83)	301-903-9649 barry.parks@science.doe.gov
Scott Willms	Participant Tritium Facility D&D LANL	505-667-5802 willms@lanl.gov
Jim McNeil	Participant Nuclear Facility D&D Consultant	843-740-1947 jimmcneil@aol.com
Ken Koller	Recorder/Participant Koller Associates/CTC Consultant/Innovative Technologies	208-524-4726 kenkoller@earthlink.net
Doug Maynor, CVS	Co-Facilitator Certified Value Specialist DOE-OH Field Office Coordinator	937-865-3986 Doug.Maynor@em.doe.gov
Jitendra Desai (part time)	Observer Ohio Program Manager DOE-EM31	301-903-1434 jitendra.desai@em.doe.gov

APPENDIX C

OHIO TECHNICAL SOLUTIONS STUDY SCOPE OF WORK

MITIGATION OF FUGITIVE EMISSIONS DURING OPEN-AIR BUILDING D&D

Miamisburg Environmental Management Project

BACKGROUND AND PROBLEM DESCRIPTION:

This technical solutions request is focused on effective and efficient demolition of two tritium-contaminated buildings (R, SW) plus three other buildings (WD, HH, and 38) with plutonium and other contaminates of concern. All five buildings are part of the Miamisburg Environmental Management Project (MEMP). The current MEMP technical approach centers on taking the buildings down and shipping them off-site as low level waste. A new D & D plan calls for leaving selected contaminated equipment and building components in place until they can be removed and disposed of during the building demolition stage. This new approach is expected to yield millions of dollars in savings in decommissioning and decontamination costs.

MEMP is located in the middle of a residential area and is currently being developed as an industrial park concurrently with the cleanup activities. Thus it is critical to MEMP that a process to stabilize, fixate, and contain the contamination be implemented in order to assure the safety of the public and the private industrial operations being located on site. All work must also conform to ALARA principles. The proposed technical solutions team study is requested to recommend the most effective method of using commercial approaches for demolishing these buildings. A recommendation for a combination of risk reducing approaches, performed at different times in the remediation process, will also be requested of the Team.

The MEMP has several additional challenges while planning for the demolition of nuclear facilities contaminated with tritium and other radionuclides (mostly alpha). Characterization of the R and SW plus the other three buildings to determine the source term of contaminants has not been fully conducted. It is not clear whether the extent of contamination residing with the buildings would require decontamination prior to demolition.

Perhaps the most pressing concern the team will need to address concerns the proper cleanup criteria needed to meet the NESHAPS requirements during demolition. MEMP intends to use CAP88 as an air dispersion model to demonstrate compliance with the NESHAPS requirements. In CAP88 it assumes that all tritium regardless of form (gas, tritium oxide or tritiated compounds such as oil film, dust, rust) will contribute 100% to the air emission. In reality, tritiated compounds will not emit

100% (i.e., more likely 10%) to the air as fugitive emission during demolition. This would cause the model to overestimate the dose caused by tritium emission.

SCOPE:

The objective of this Technical Solutions Team is to recommend improvements to the proposed baseline technologies in demolishing the tritium and plutonium contaminated buildings. The Team will also be expected to identify opportunities for cost and schedule savings. Technical Solutions Team members with the expertise and experience needed to support the request for assistance from MEMP will be provided by the Office of Science and Technology.

The Team will be provided with extensive background information concerning the problems being addressed and the presently proposed technical solutions prior to arrival at the site. Upon arrival, the Team will receive a detailed briefing on the current baseline technology for the decommissioning and takedown of the contaminated buildings. The Team will then tour the buildings with the contractor and have any questions fully answered before the development of possible alternatives begins.

After the baseline briefing and tour, the team shall determine if more effective alternatives are available to achieve the closure objectives with improved cost and schedule. While MEMP's current contractor has a plan for demolishing all of the selected buildings, the team should independently develop and recommend any technologies or different technical approaches currently available which can improve the proposed approach. The Team will be expected to concentrate on methods to reduce fugitive emission either before or during demolition. In addition to the obvious reduction in risk, the alternatives proposed should offer improvements over the cost and schedule resulting from the baseline methodology.

OBJECTIVES:

The primary objective of the Technical Solutions Team is to improve the MEMP Exit Plan by identifying better technologies and processes for demolition of selected building on the critical path of the MEMP Closure. Specific problem areas to be addressed by the Technical Solutions Team are:

1. Tritium release factor for use in CAP88 calculations
2. Regulator/NESHAPS interpretation on cleanup criteria for nuclear facilities
3. Reduce fugitive emissions before and during demolition
4. Improved demolition techniques/technologies

DELIVERABLES:

The recommended alternatives (if any) will be developed to the extent possible and presented to DOE and Contractor management as a draft final report prior to leaving the site. It is anticipated that after completion of the final report, some portion of the team will be made available for consultation during the course of removal of the buildings and the remediatation of the soil and structures underneath. The consultation may range from phone calls to site visits either individually or as part of a team.

SCHEDULE:

The tentative schedule is as follows:

- Initial Site Call – 5/14/02
- Received Technical Solutions Request – 5/20/02
- Site Call to Clarify Request – 6/12/02
- Headquarter Call to Review Draft Approach (i.e., schedule, team, scope, agenda, cost, logistics) -- 7/3/02
- Proposed Site Visit – 7/29/02 through 7/30/02
- Closeout and Distribute Draft Report – 7/30/02
- Complete Final Report – 8/15/02

APPENDIX D

Attendance List for August 1, 2002 Workshop Presentation

Name	Organization	Telephone	E-Mail
Cliff Carpenter	NETL/DOE	304-285-4041	Cliff.Carpenter@netl.doe.gov
Sam Martin	SAMI	303-674-6900	smartin@value-engineering.com
Dave Eaton	INEEL	208-526-7002	dle@inel.gov
Ken Kasper	Scientech, Inc.	864-235-3694	kkasper@scientech.com
Dick Merservy	INEEL	208-526-1834	rhm@inel.gov
Barry Parks	DOE/SC-83	301-903-9649	barry.parks@science.doe.gov
Scott Willms	LANL	505-667-5802	willms@lanl.gov
Jim McNeil	Consultant	843-740-1947	jimmcneil@aol.com
Ken Koller	Consultant	208-524-4726	kenkoller@earthlink.net
Doug Maynor	DOE OH	937-865-3986	Doug.Maynor@em.doe.gov
Jitendra Desai	DOE-EM31	301-903-1434	jitendra.desai@em.doe.gov
Cid Voth	Battelle-Columbus	614-424-4722	voth@battelle.org
Jim Griffin	DOE-CEMP	614-424-5707	Jim.Griffin@ohio.doe.gov

NEED COMPLETE LIST

APPENDIX E

Innovative Technology List

Equipment Name	Vendor Name	Contact Name	Telephone/E-mail	Website Address
Characterization Technologies				
Long Range Alpha Detection IonSen™ Cut Pipe Monitor	BNFL Instruments, Inc.	Fred Gardner	423-675-4217 fgardner@usit.net	
Pipe Explorer Surveying System	Science & Engineering Associates, Inc.	C. David Cremer	505-844-2000 cdcremer@seabase.com	
Pipe Inspection using Pipe Crawler	Radiological Services, Inc.	Jim McCleer	860-443-4944 rsi@radiological services.com	
Radiation Mapping (LARADS)	Bechtel Hanford, Inc.	Stephen Pulsford	509-373-2769 pulsford@bnl.gov	
GammaCam® Radiation Imaging System	AIL System, Inc.	Richard A. Migliaccio	516-595-5595 migiaccio@ail.com	
Surface Containment and Survey Information Management System	SRA	Joseph Shonka	770-509-7607 sra@crl.com	
Gamma-Ray Imaging	PSC	Frank Lopez	505-662-4192	
3-D Gamma Modeler™	AIL Systems	Michael VanWart	631-595-6815	
CDI Remote Characterization System	ORNL-RTDP	Dennis Haley	423-576-4388 haleydc@ornl.gov	
Cogema 3D Gamma Imaging System	Cogema Engineering	Dennis Hamilton	509-372-1130 information@cogtema-engineering.com	
DISPIM™ Imaging System	Kaiser-Hill, LLC	Charles Brown	303-966-5277 charles.brown@rfets.gov	
E-PERM Alpha Surface Monitor	Rad Elec, Inc.	Paul Kotrappa	301-694-0011 kotrappa@ix.netcom.com	

Equipment Name	Vendor Name	Contact Name	Telephone/E-mail	Website Address
Lumi-Scint Portable Liquid Scintillation Counter	Bio Scan	Seth Schulman	800-255-7226 support @bioscan.com	
Mobile Characterization for Large Crates	MCS	Eric Pennala	505-823-0111	
Decontamination Technologies				
ALARA 1146 Strippable Coatings	Williams Power Company	TJ McNamara	410-620-3373, mcnamara@wmsgrpintl.com	
Soft Media Blast Cleaning	AEA Technologies, Inc.	Edward Damien	704-875-9573	
Remotely Operated Scabbling	Pentek, Inc.	Linda Lukart-Ewansik	412-262-0725, pentekusa@aol.com	
Lead TechXtract Chemical Decontamination	EET Corp./Active Environmental Technologies, Inc.	Ron Borah/ W. Scott Fay	219-464-4365/609-702-1500	
Steam Vacuum Cleaning	Container Products Corporation	Acton Downing	910-392-6100	
Reactor Surface Contamination Stabilization	Master-Lee Engineering RedHawk Environmental	Don Kooser Marc Azure	509-783-3523 509-946-8608	
Concrete Shaver	Marcrist Industries Ltd.	Ian Bannister	+44 (0) 1302 890888	
Concrete Spaller	PNNL	Mark Mitchell	509-372-4069	
ROTO PEEn Scalar and VAC-PAC	Pentek, Inc.	Linda Lukart-Ewanik	412-262-0725, pentekusa@aol.com	
Rotary Peening with Captive Shot	EM Abrasive Systems Division	Peter J. Fritz	612-736-3655	
Centrifugal Shot Blast System	Concrete Cleaning, Inc.	Mike Connacher	509-226-0315	
Concrete Grinder	CS Unitec, Inc.	Doug Dow	800-700-5919	

Equipment Name	Vendor Name	Contact Name	Telephone/E-mail	Website Address
Advanced Recyclable Media System	Surface Technology Systems, Inc./ Advanced Recyclable Media Systems, Inc.	Steven M. Pocock/CG Gillooly	330-497-5905/919-941-0847	
Dismantlement Technologies				
Size Reduction Machine	Special Application Robotics/Mega-Tech Services (Champion Shear	Dan Johnson/R. Jon Stoucky	303-571-2828/336-316-0707	
Universal Demolition Processor	Fernald	Kathy Nickel	336-316-0707, kathi.nickel@fernald.gov	
Diamond Wire Cutting	Bluegrass Concrete Cutting, Inc./Master Builders, /Tailored Chemical Products	Nicholas Jenkins/Michael Allen/Jack Temple III	800-734-2935 800-722-8899 800-627-1687	
VecLoader HEPA Vacuum Insulation Removal	Vector Technologies Ltd.	Brent Alexander	800-832-4010 or 414-247-7100	
Remote Control Concrete Demolition System: Brokk	Duane Equipment Corporation	Toby Duane	888-273-2511	
ROSIE Mobile Robot Work System	RedZone Robotics, Inc.	Tim Denmeade	412-765-3064	
Oxy-Gasoline Torch	Petrogen International, Ltd.	Milt Heft	510-237-7274	
High-Speed Clamshell Cutter	Tri Tool, Inc.	Paul Riley	916-351-0144	
Concrete Dust Suppression System	Rowand Machinery	Dennis Kimbell	509-547-8813	
Self Contained Pipe Cutting Shear	LRT	Chris Lukas	540-891-6600	

Equipment Name	Vendor Name	Contact Name	Telephone/E-mail	Website Address
Pipe Cutting and Crimping System	DOE-MEMP	James O. Johnson	937-847-5234, James.O.Johnson@ohio.doe.gov	
Mega-Tech Blade Plunging Cutter	Mega-Tech Services, Inc.	Jon Stouky	888-522-5185, istouky@aol.com	
Worker Health and Safety Related Technologies				
Wireless Remote Radiation Monitoring System (WRRMS)	Bechtel Hanford, Inc.	Stephen Pulsford	509-375-4640, pulsford@bnl.gov	
Personal Ice Cooling System (PICS)	Delta Temax, Inc.	Kirk Dobbs	613-735-3996	
Heat Stress Monitoring System	Mini-Mitter	Denny Ebner	541-593-8639	
AeroGo Air Lift Pallet System	AeroGo, Inc.	Bob Jeffers	800-426-4757	
Excel Automatic Lockng Scaffold	Bartlett Services, Inc.	James E. Elkins	800-225-0385	
Vendor Contacts for Equipment and Materials				
Fixatives: Pos-A-Fix	Diversified Services, Inc.	John McDonnell	423-542-9100	
Shrinkwrap: Zor-Pac Shrink Film	Zormot International, Inc.	Rob Hoogenstyn	800-459-5422,	www.zormot.com

Equipment Name	Vendor Name	Contact Name	Telephone/E-mail	Website Address
Containments: PermaCon	NFS-RPS	Mark Greenleaf or Ann Williams	888-637-7779, support@RPSCT.com	www.NFSRPS.com
Custom soft sided tents	Lanc Industries	Ron Therrin	401-884-2341	
Ventilation Systems	NFS-RPS	Mark Greenleaf or Ann Williams	888-637-7779, support@RPSCT.com	www.NFSRPS.com
Soil Protection	D&E Control			http://nwci.com/de.html
Soil Protection	TerraTac			http://www.terra-firma-ind.com/terratac.htm
Soil Protection	Syntec			http://syntechproducts.com
Fogging Systems	Fogco			http://www.fogco.com/dust.htm
Trailer mounted portable dust collector				http://www.cwmfg.com/mobile.htm
Dust Suppression Techniques	(during structural demolition)		(search for "dust suppression")	http://131.94.181.16/ftsearch/ftSeachFR.html
Communications	Safecom	Mark Greenleaf or Ann Williams	Support @RPSCT.com	www.NFSRPS.com
Race Scan	RFS-RPS	Bill Rambo	860-445-0334	